BETA

SIMULATION SOLUTIONS

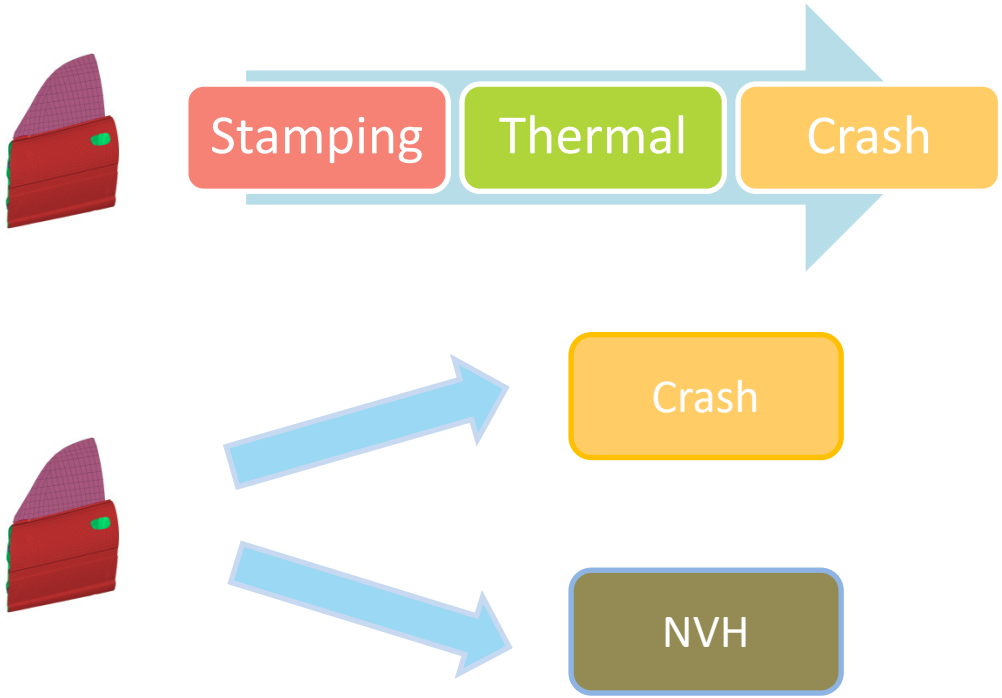
Groundbreaking Simulation Solutions

physics on screen

Breaking down the interoperability barrier among different FEA software

Athanasios Fassas BETA CAE Systems
Georgios Mokios BETA CAE Systems

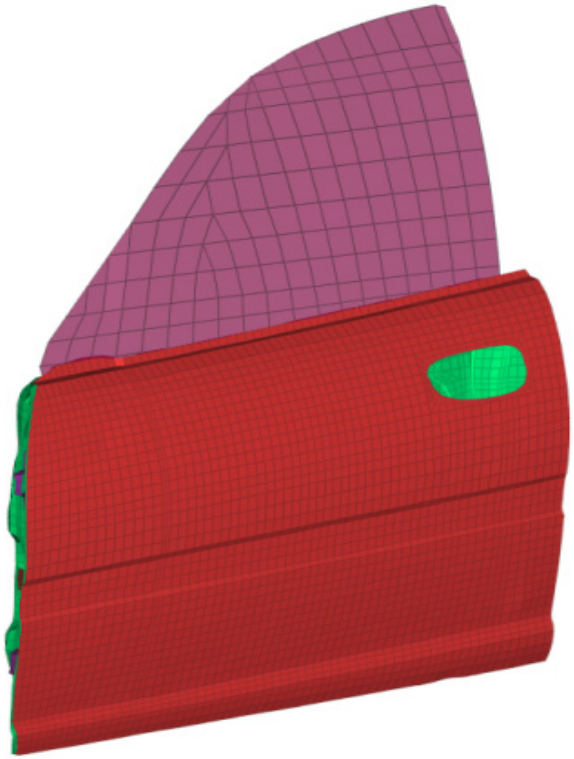
Problem Definition



Common model

- Process in sequence
- Separate processes

Common Model

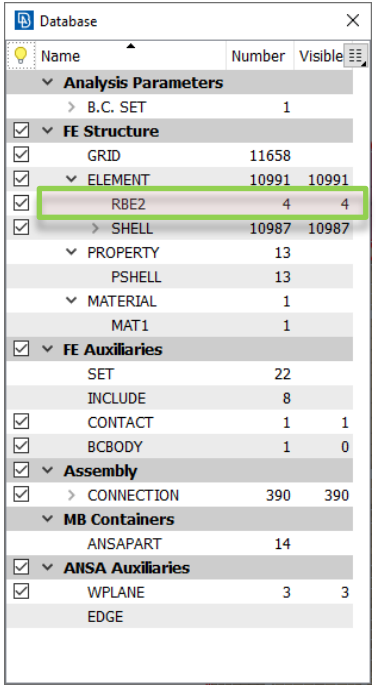


Full Door Model

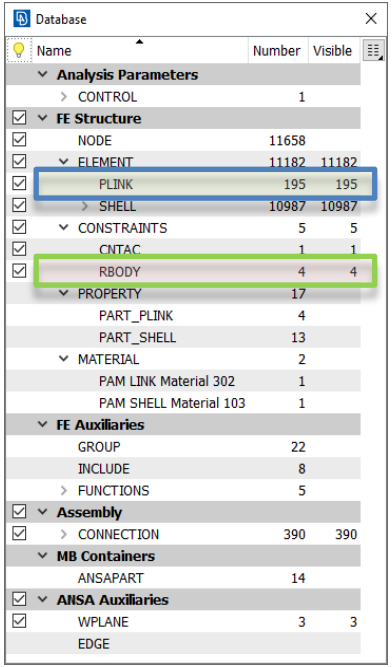
- Elements
- Nodes
- Assembly entities
  - Rigids
  - Constraints
  - Contacts
- Properties
- Materials

Convert entities

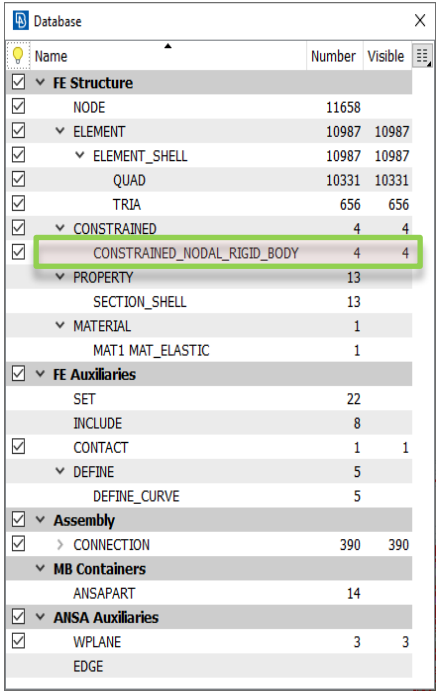
NASTRAN



PAMCRASH



LSDYNA



Entities

- Common
  - Nodes
  - Elements
- All formats
  - RBE2
- Solver specific
  - PLINK

Support entities

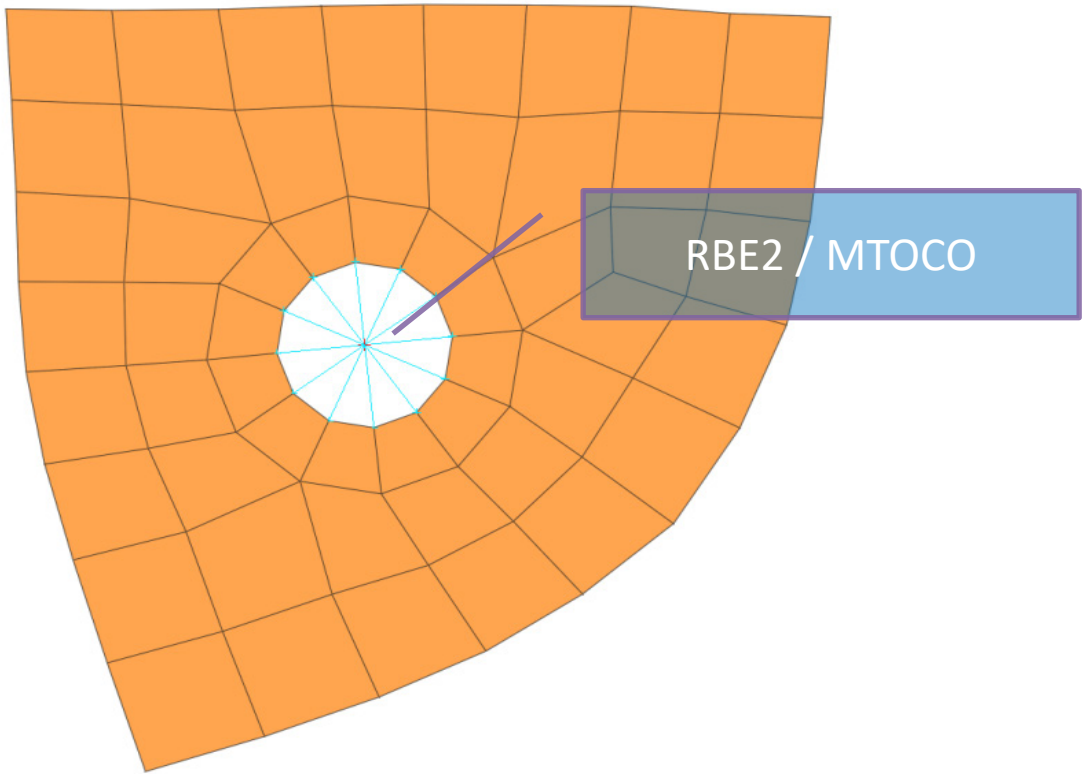
- VMAP_RBE_<type>
  - <xo, yo, zo> #{position}
  - 1200 #{property id}
  - 100238 – 110956 #{connectivity}

  OR
  - [10, 11,12 …] #{node ids}

Common Entities

- VMAP_RBE
- Solver translation
  - RBE2/RBE3 in NASTRAN
  - MTOCO/OTMCO in PAM

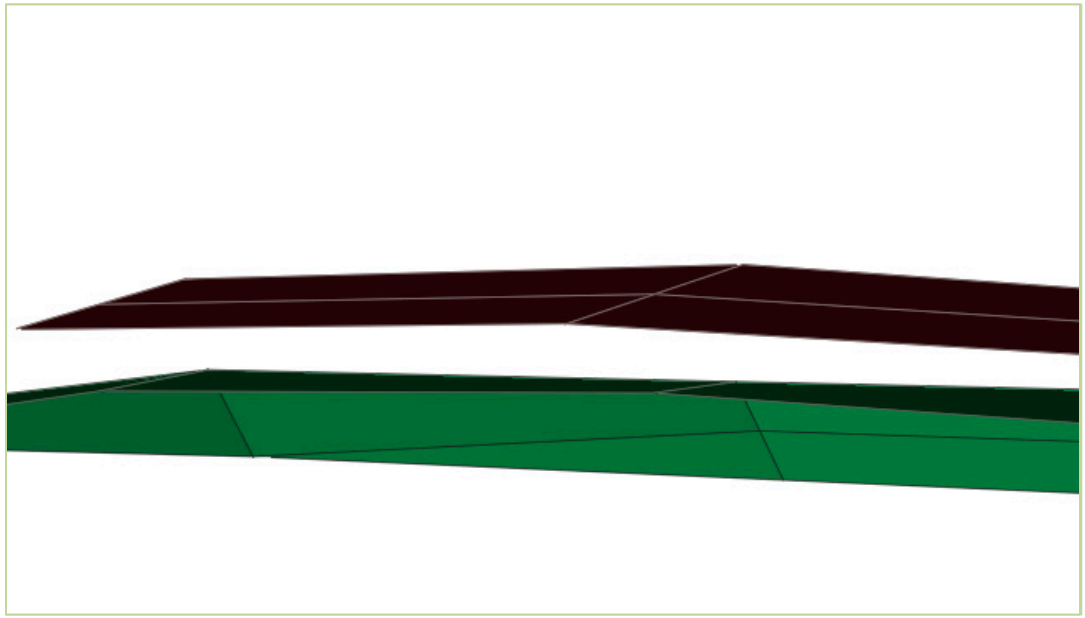
Support entities



Common Entities

- VMAP_RBE
- Solver translation
  - RBE2 in NASTRAN
  - MTOCO in PAM

Support entities



Missing Entities

- VMAP entity
- Neutral entity

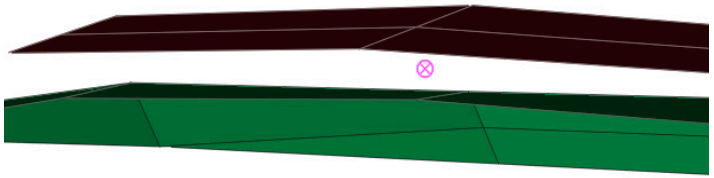
Support entities

- VMAP_CNCT
  - <xo, yo, zo> #{position}
  - 100238 – 110956 #{connectivity}
  - 1200 #{property id}
  - NASTRAN #{solver}
    - CWELD #{FE-entity}
  - PAMCRASH #{solver}
    - PLINK #{FE-entity}
  - …

VMAP entity format

- ***VMAP_CNCT***
  - minimum required information
    - Connectivity
    - Position
    - Property
    - Solver entity
  - Solver must ‘translate’ the entity

Support entities

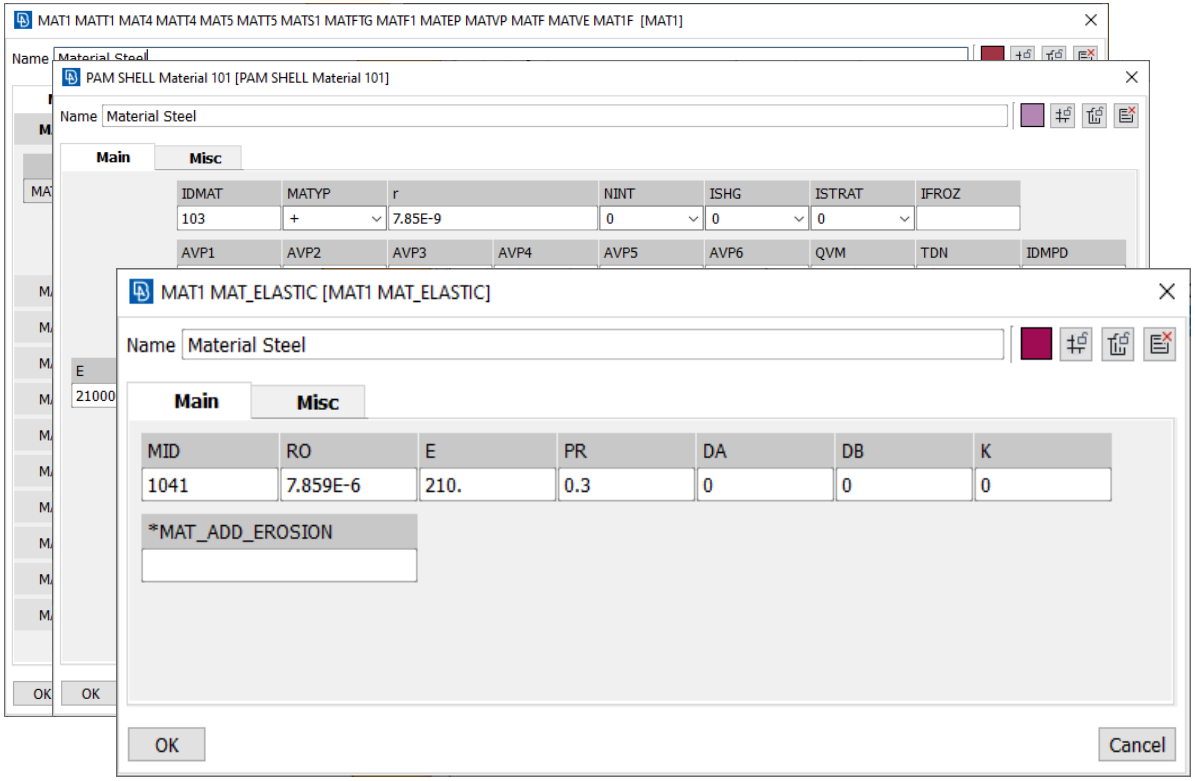


```
<?xml version="1.0" encoding="UTF-8"?>
<xml_connection_file xmlns:xsi="http://www.w3.org/2000/10/XMLSchema-insta
  <version> 1.0.0 </version>
  <connection_group>
    <id> 1 </id>
    <connected_to>
      <pid> 1514 </pid>
      <pid> 1512 </pid>
    </connected_to>
    <connection_list>
      <connection_0d>
        <id> 100004 </id>
        <type>spotweld</type>
        <loc> -2917.23  -747.52  881.929 </loc>
        <info>  dia  5. </info>
        <info> user_attribute Connectivity_Inspection/Approval Needs Chec
      </connection_0d>
      <connection_0d>
```

Define a neutral entity

- ***Generic CNCT***
  - Neutral format
  - Information
    - Connectivity
    - Position
    - Property
    - Solver Entity
  - Solver creates the needed entity

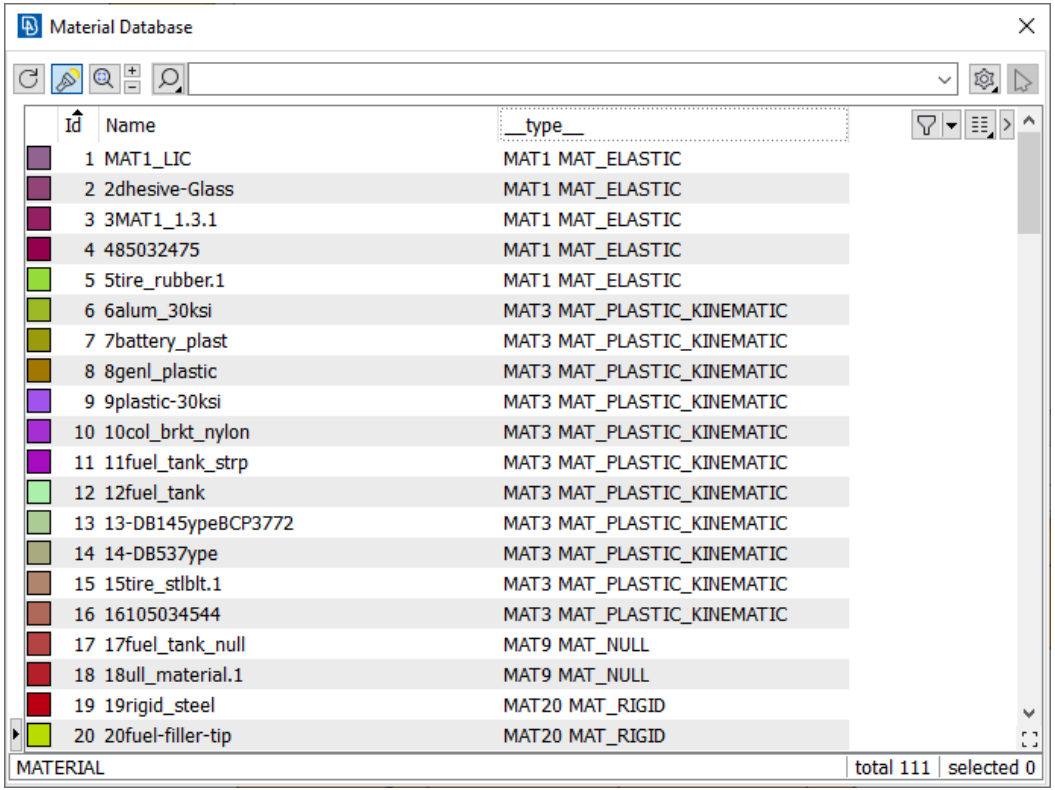
Convert Materials



Material Cards

- Different models
- Different definitions

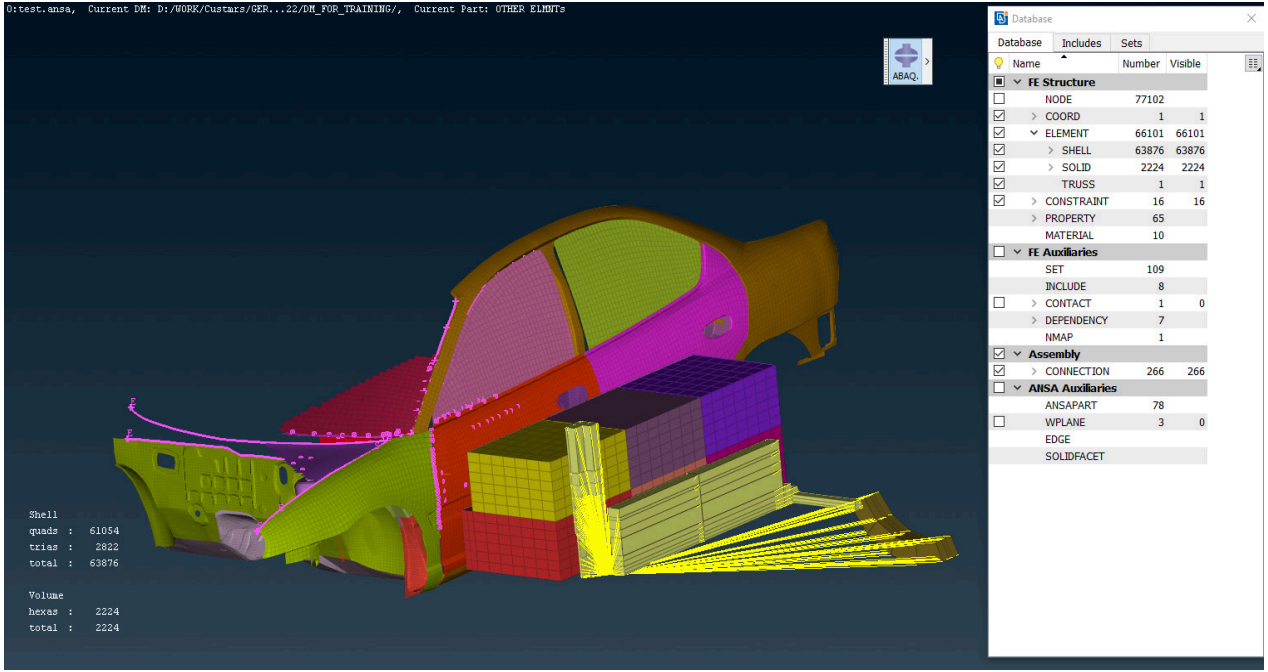
Convert Materials – Material DB



Material Database

- Model definition by Id or name
- Solver updates material information

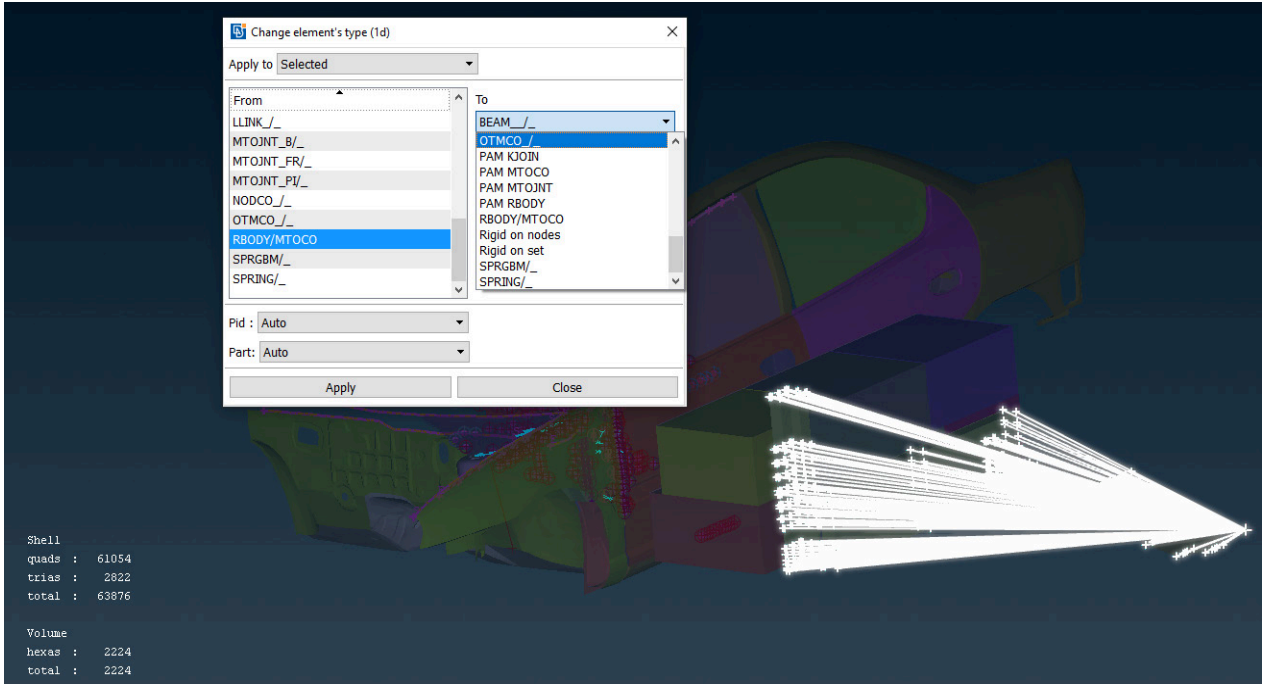
Working in ANSA



Interoperability

- Model set-up for any solver
- Interoperability among different solvers

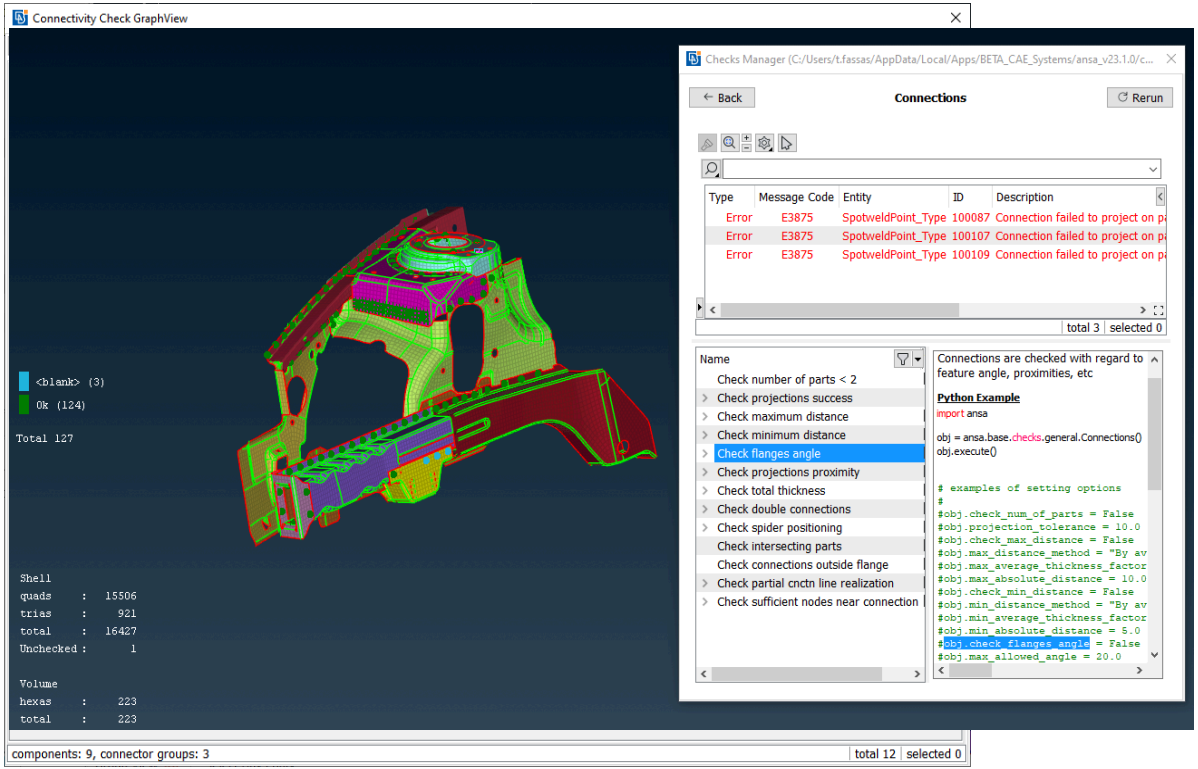
Working in ANSA



Convert entities

- Hard-coded
- Soft-coded

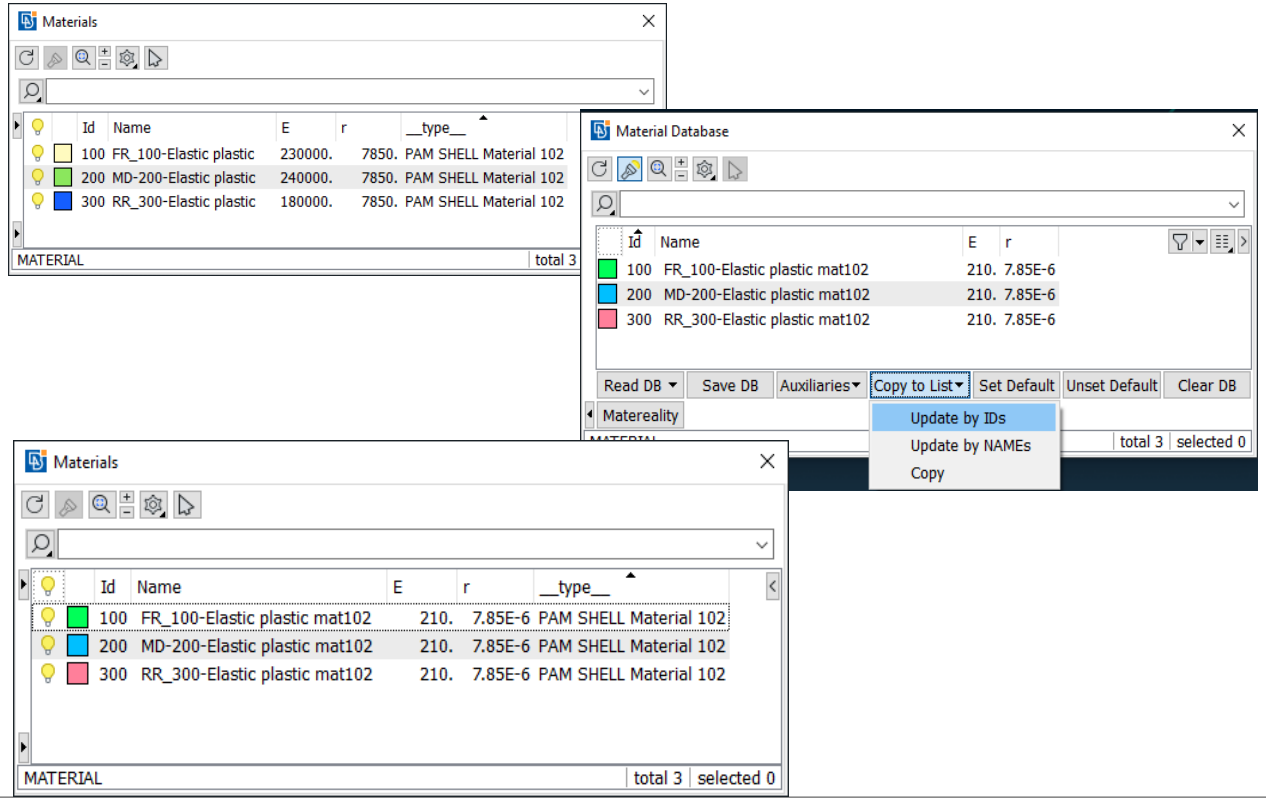
Working in ANSA



Connection Entities

- All connectivity formats
- Integrity checks

Working in ANSA



Material Update

- Solver updates material information

VMAP format in ANSA

ANSA
PRE PROCESSOR

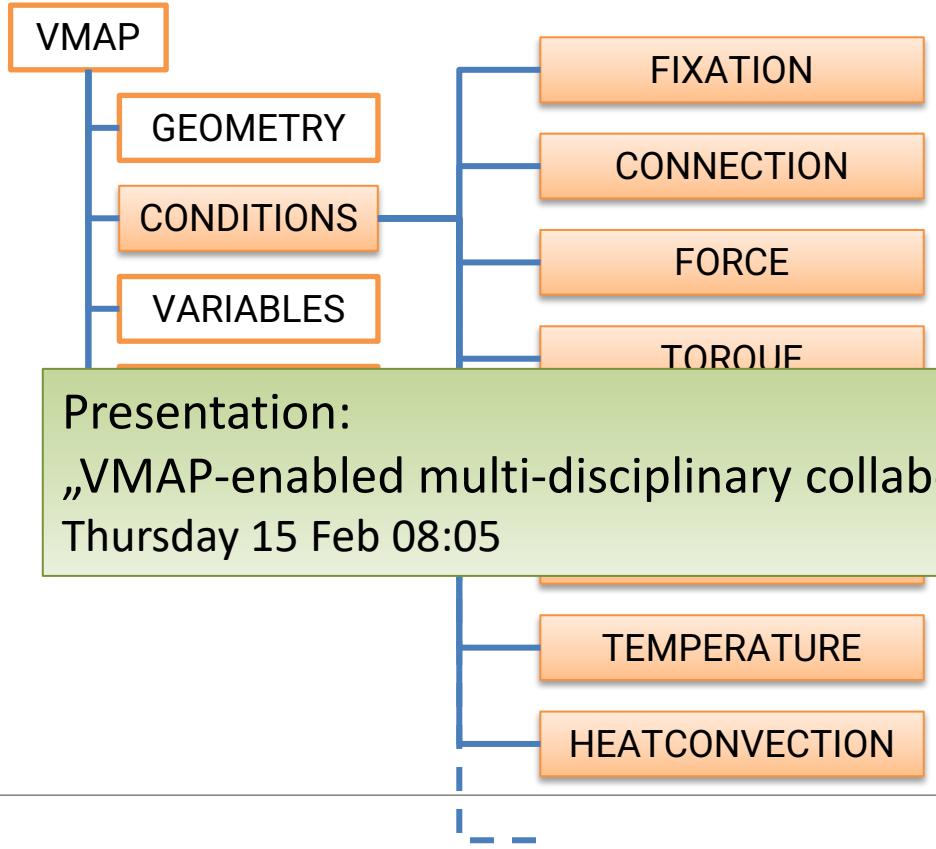
- NASTRAN
- LS-DYNA
- PAM-CRASH
- ABAQUS
- RADIOSS
- ANSYS
- PERMAS
- OPTISTRUCT
- MARC
- ACTRAN
- IMPETUS
- MOLDEX3D
- SESTRA
- CFD++
- FLUENT
- FLUENT-2D
- OPENFOAM
- STAR
- UH3D
- SC/TETRA
- TAITHERM
- THESEUS
- TAU
- CGNS
- CGNS-2D

VMAP

ANSA for VMAP

- Start with:
  - VMAP file
  - Solver format
- Work in any solver definition
- Output VMAP format

Suggestion for VMAP extension: CONDITIONS group
→ Boundary Conditions + Loads

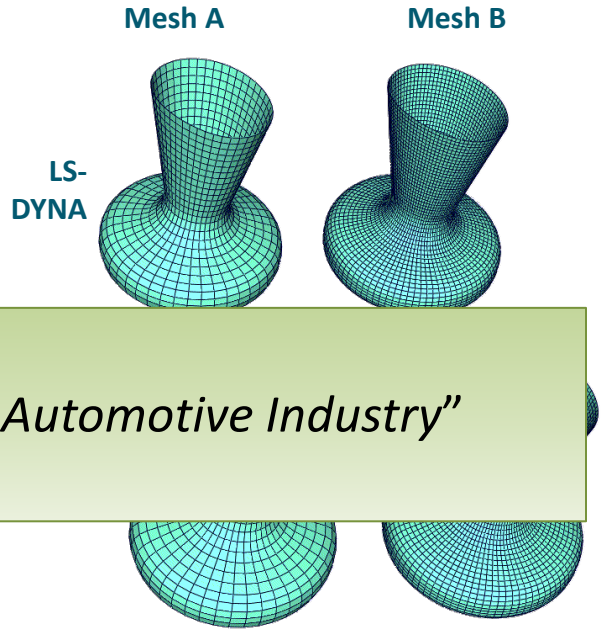


“VMAP-enabled multi-disciplinary collaboration on jet engine design”

Presentation:
„VMAP-enabled multi-disciplinary collaboration on jet engine design”
Thursday 15 Feb 08:05

SMILE

UNIFIED SIMULATION MODELLING LANGUAGE

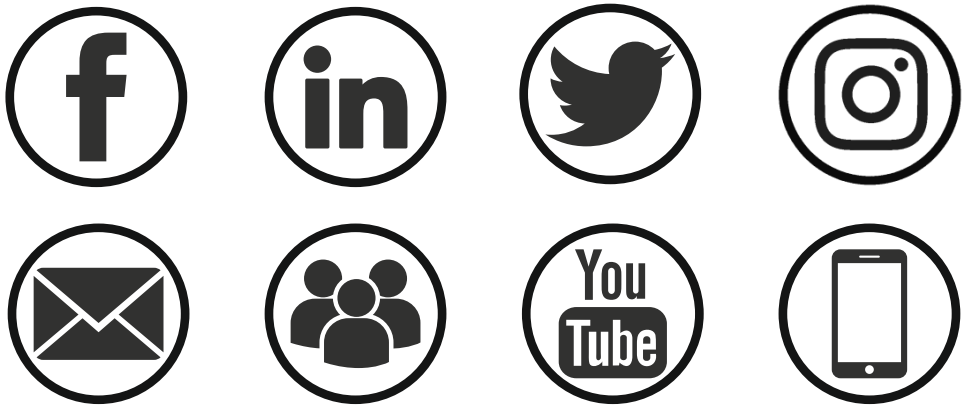


- Solver independent

Presentation:
„Standardized Simulation Workflows in the Automotive Industry"
Thursday 15 Feb 09:20

- Hierarchical and object oriented
- Supports democratization of simulation
- Support multiple discretizations

BETA
SIMULATION SOLUTIONS



Stay connected